

## CLAIMS

1. (currently amended) A method for processing interactive user control with a scene of a video clip, comprising:

identifying a head of a user that is to interact with the scene of the video clip;

storing an initial frame of image data representing the head of the user;

tracking the identified head of the user during display of the video clip, the tracking enabling detection of a change in position of the head of the user, the tracking including,

identifying a search region within a frame of the video clip; and

comparing values within the search region to template values of the initial frame of the stored image data; and

adjusting a view-frustum in accordance with the change in position of the head of the user; and

repeating the identifying the search region, the comparing, and the adjusting for successive frames of the video clip, wherein the comparing is performed with the initial frame of the stored image data.

2. (original ) The method of claim 1, wherein a view-frustum is initially defined by a triangular gaze projection set between outer edges of a virtual window and a

virtual position of the head when the virtual position of the head is normal to a center point of the virtual window.

3. (original ) The method of claim 2, wherein adjusting the view-frustum moves the virtual position of the head away from normal relative to the center point of the virtual window.

4. (original ) The method of claim 3, wherein the virtual position of the head being away from normal relative to the center point of the virtual window changes an angle of the triangular gaze projection, the change in angle of the triangular gaze projection displays a change in viewing angle of the scene provided by the video clip.

5. (original ) The method of claim 4, wherein the change in viewing angle of the scene is a result of the detected movement of the head of the user to enable the interaction with the scene.

6. (currently amended) The method of claim 1, wherein successive frames are compared to determine a relative distance of the head of the user to manipulate a scale of the scene being presented ~~identifying the head of the user includes capturing a template of a face for the head.~~

7. (currently amended) The method of claim 1, wherein a capture device having depth capturing capability determines a relative distance of the head of the user to manipulate a scale of the scene being presented 6, wherein the change in position of the head of the user is continuously tracked frame by frame of the video clip to enable continual adjustments of the view frustum so that a viewing angle of the scene is changed in response to the changes in position of the head of the user.

8. (currently amended) The method of claim 1, wherein the initial frame of image data is marker-less 6, wherein capturing the template includes, obtaining a marker-less image of the face for the head of the user.

9. (currently amended) The method of claim 1, wherein the initial frame of data is maintained throughout the video clip 6, wherein a camera is used to enable the capturing.

10. (original ) The method of claim 1, wherein the video clip is of a video game.

11. (original ) The method of claim 10, wherein the interaction with the scene by tracking movement of the head of the user is independent of user hand-held controls for interacting with the video game.

12. (original ) The method of claim 1, wherein the method operation of tracking the identified head of the user during display of the video clip includes,

tracking a facial portion of the head; and

matching gray scale image data associated with the facial portion to image associated with a template of the facial portion.

13. (original ) The method of claim 1, wherein the method operation of adjusting a view-frustum in accordance with the change in position of the head of the user includes,

identifying a point of interest of the scene of the video clip; and

modifying the view-frustum so that the point of interest appears at a constant position when displayed in successive video clips.

14. (currently amended) A method for processing interactive user control with a scene of a video clip, comprising:

identifying a head of a user that is to interact with the scene of the video clip;

storing an initial frame of image data representing the head of the user for a duration of the video clip;

tracking the identified head of the user during display of the video clip, the tracking enabling detection of a change in position of the head of the user, the tracking including,

identifying a search region within a frame of the video clip; and

comparing values within the search region to template values of the initial frame of image data; and

translating a view-frustum in accordance with the change in position of the head of the user; and

successively updating the view frustum according to the change in position of the head of the user relative to the initial frame of image data.

15. (original ) The method of claim 14, wherein a view-frustum is defined by a triangular gaze projection set between outer edges of a virtual window and a virtual position of the head when the virtual position of the head is normal to a center point of the virtual window.

16. (original ) The method of claim 15, wherein translating the view-frustum maintains the virtual position of the head normal to the center point of the virtual window.

17. (original ) The method of claim 15, wherein the translating enables a change in the scene provided through the virtual window.

18. (original ) The method of claim 14, wherein the method operation of tracking the identified head of the user during display of the video clip includes, scanning a portion of each frame of the video clip for the identified head.

19. (original ) The method of claim 14, wherein the method operation of translating a view-frustum in accordance with the change in position of the head of the user includes,

shifting a scene defined through the view-frustum while maintaining a lateral orientation of the head to a view port.

20. (original ) The method of claim 14, wherein the method operation of translating a view-frustum in accordance with the change in position of the head of the user includes,

maintaining a focus on an object in the scene through adjustment of a view port size.

21. (original ) The method of claim 14, wherein the method operation of translating a view-frustum in accordance with the change in position of the head of the user includes,

rotating the view-frustum about the head of a user according to the change in position of the head of the user.

22. (currently amended) A method for managing a visible volume displayed through a view port, comprising:

storing an initial frame of marker-less image data of a head of a user;

locating ~~a the~~ head of ~~a the~~ user in successive frames;

capturing image data associated with the head of the user at a different location in the successive frames;

scanning a search region defined within the image data;

identifying the different location of the head of the user within the search region for the successive frames based on a comparison with the initial frame of marker-less image data; and

adjusting the visible volume based upon the location of the head of the user relative to the view port.

23. (original) The method of claim 22, wherein the method operation of scanning a search region defined within the image data includes,

defining boundaries of the search region according to a maximum distance the head of the user moves between successive video frames.

24. (original) The method of claim 22, wherein the method operation of scanning a search region defined within the image data includes, comparing a template of a facial region of the head of the user with corresponding image areas generated through the scanning of the search region.

25. (original) The method of claim 22, wherein the method operation of locating a head of a user includes, capturing image data representing a facial region of the head; and storing the image data representing the facial region.

26. (original) The method of claim 22, wherein the method operation of adjusting the visible volume based upon the location of the head of the user relative to the view port includes, defining a change of the visible volume being displayed according to a degree of movement of the location of the head.

27. (original) The method of claim 22, wherein the method operation of adjusting the visible volume based upon the location of the head of the user relative to the view port includes,

adjusting a scale associated with the visible volume according to a distance between the head and the view port.

28. (currently amended) A computer readable medium having program instructions for processing interactive user control with a scene of a video clip, comprising:

program instructions for identifying a head of a user that is to interact with the scene of the video clip;

program instructions for storing an initial frame of image data representing the head of the user;

program instructions for tracking the identified head of the user during display of the video clip, the tracking enabling detection of a change in position of the head of the user, the program instructions for tracking including,

program instructions for identifying a search region within a frame of the video clip; and

program instructions for comparing values within the search region to template values of the initial frame of the stored image data; and

program instructions for adjusting a view-frustum in accordance with the change in position of the head of the user; and

program instructions for repeating the identifying the search region, the comparing, and the adjusting for successive frames of the video clip, wherein the comparing is performed with the initial frame of the stored image data.

29. (currently amended) The computer readable medium of claim 28, wherein the program instructions for identifying the head of the user includes,

program instructions for comparing successive frames to determine a relative distance of the head of the user to manipulate a scale of the scene being presented  
eapturing a template of a face for the head.

30. (currently amended) The computer readable medium of claim 28, wherein the initial frame of image data is marker-less change in position of the head of the user is continuously tracked frame by frame of the video clip to enable continual adjustments of the view-frustum so that a viewing angle of the scene is changed in response to the changes in position of the head of the user.

31. (currently amended) The computer readable medium of claim 29, wherein the relative distance of the head is provided through data from a capture device having depth capability program instructions for capturing the template includes,

~~program instructions for obtaining a marker-less image of the face for the head of the user.~~

32. (currently amended) The computer readable medium of claim 28, wherein the program instructions for tracking the identified head of the user during display of the video clip includes,

program instructions for tracking a facial portion of the head; and  
program instructions for matching gray scale image data associated with the facial portion to a facial portion of the initial frame of image data associated with a template of the facial portion.

33. (original ) The computer readable medium of claim 28, wherein the program instructions for adjusting a view-frustum in accordance with the change in position of the head of the user includes,

program instructions for identifying a point of interest of the scene of the video clip; and

program instructions for modifying the view-frustum so that the point of interest appears at a constant position when displayed in successive video clips.

34. (currently amended) A computer readable medium having program instructions for processing interactive user control with a scene of a video clip, comprising:

program instructions for identifying a head of a user that is to interact with the scene of the video clip;

program instructions for storing an initial frame of image data representing the head of the user for a duration of the video clip;

program instructions for tracking the identified head of the user during display of the video clip, the tracking enabling detection of a change in position of the head of the user, the program instructions for tracking including,

program instructions for identifying a search region within a frame of the video clip; and

program instructions for comparing values within the search region to template values of the initial frame of image data; and

program instructions for translating a view-frustum in accordance with the change in position of the head of the user; and

successively updating the view frustum according to the change in position of the head of the user relative to the initial frame of image data.

35. (original ) The computer readable medium of claim 34, wherein the program instructions for tracking the identified head of the user during display of the video clip include,

program instructions for scanning a portion of each frame of the video clip for the identified head.

36. (original ) The computer readable medium of claim 34, wherein the program instructions for translating a view-frustum in accordance with the change in position of the head of the user include,

program instructions for shifting a scene defined through the view-frustum while maintaining a lateral orientation of the head to a view port.

37. (original ) The computer readable medium of claim 34, wherein the program instructions for translating a view-frustum in accordance with the change in position of the head of the user include,

program instructions for maintaining a focus on an object in the scene through adjustment of a view port size.

38. (original ) The computer readable medium of claim 34, wherein the program instructions for translating a view-frustum in accordance with the change in position of the head of the user includes,

program instructions for rotating the view-frustum about the head of a user according to the change in position of the head of the user.

39. (currently amended) A computer readable medium having program instructions for managing a visible volume displayed through a view port, comprising:

program instructions for storing an initial frame of marker-less image data of a head of a user;

program instructions for locating ~~a the head of a the user in successive frames;~~  
capturing image data associated with the head of the user at a different location in the successive frames;

scanning a search region defined within the image data;  
identifying the different location of the head of the user within the search region for the successive frames based on a comparison with the initial frame of marker-less image data; and

program instructions for adjusting the visible volume based upon the location of the head of the user relative to the view port.

40. (original) The computer readable medium of claim 39, wherein the program instructions for identifying the different location of the head of the user within the search region includes,

program instructions for calculating a difference between values associated with a template of the head and a template of the head at the different location.

41. (original) The computer readable medium of claim 40, wherein the program instructions for scanning a search region defined within the image data includes, program instructions for defining boundaries of the search region according to a maximum distance the head of the user moves between successive video frames.

42. (original) The computer readable medium of claim 40, wherein the program instructions for scanning a search region defined within the image data includes, program instructions for comparing a template of a facial region of the head of the user with a corresponding template generated through the scanning of the search region.

43. (original) The computer readable medium of claim 39, wherein the program instructions for locating a head of a user includes, program instructions for capturing image data representing a facial region of the head; and program instructions for storing the image data representing the facial region.

44. (original) The computer readable medium of claim 39, wherein the program instructions for adjusting the visible volume based upon the location of the head of the user relative to the view port includes,

program instructions for defining a change of the visible volume being displayed according to a degree of movement of the location of the head.

45. (original) The computer readable medium of claim 39, wherein the program instructions for adjusting the visible volume based upon the location of the head of the user relative to the view port includes,

program instructions for adjusting a scale associated with the visible volume according to a distance between the head and the view port.

46. (currently amended) A system enabling interactive user control for defining a visible volume being displayed, comprising:

a computing device;

a display screen in communication with the computing device, the display screen configured to display image data defined through a view-frustum;

a tracking device in communication with the computing device, the tracking device capable of capturing a location change of a control object, wherein the location change of the control object effects an alignment of the view-frustum relative to the display screen, wherein the computing device stores a marker-less reference image of the

control object for comparison to each successive frame of image data captured through the tracking device.

47. (original ) The system of claim 46, wherein the tracking device is a camera.

48. (original ) The system of claim 46, wherein the computing device is a video game console.

49. (original ) The system of claim 46, wherein the computing device is configured to map coordinates associated with the location change of the control object to a view change associated with a virtual camera position.

50. (original ) The system of claim 46, wherein the computing device is configured to maintain a substantially normal gaze direction relative to a plane associated with the display screen for both the view-frustum and a view-frustum associated with the location change of the control object.

51. (original ) The system of claim 46, wherein the computing device is configured to adjust a view port size associated with the image data so that when the view-frustum is adjusted, focus on an object within the view-frustum is maintained.

52. (currently amended) A computing device, comprising:

a memory configured to store an initial frame of image data for a template of a control object;

a processor capable of receiving a video signal tracking the control object, the processor including,

logic for comparing a portion of a frame of the video signal to the initial frame of the template;

logic for identifying a change in a location of the control object in the portion of the frame relative to a location of the control object associated with the template; and

logic for translating the change in the location of the control object to adjust a view-frustum associated with an original location of the control object, wherein successive frames of the video signal are compared to the initial frame to identify the change in the location of the control object.

53. (original ) The computing device of claim 52, wherein the logic for translating the change in the location of the control object to adjust a view-frustum associated with an original location of the control object includes,

logic for shifting boundaries of a visible scene being displayed on a display screen in communication with the computing device.

54. (original ) The computing device of claim 52, wherein the computing device is a video game console.

55. (original ) The computing device of claim 52, wherein the template is stored as grayscale image data.

56. (original ) The computing device of claim 52, wherein the logic for comparing a portion of a frame of the video signal to the template includes, logic for scanning the portion of the frame of the video signal.

57. (original ) The computing device of claim 52, wherein the control object is a head of a user.

58. (original ) The computing device of claim 57, wherein the logic for translating the change in the location of the control object to adjust a view-frustum associated with an original location of the control object includes, logic for adjusting a scale associated with a display signal according to a distance between the head and a view port.